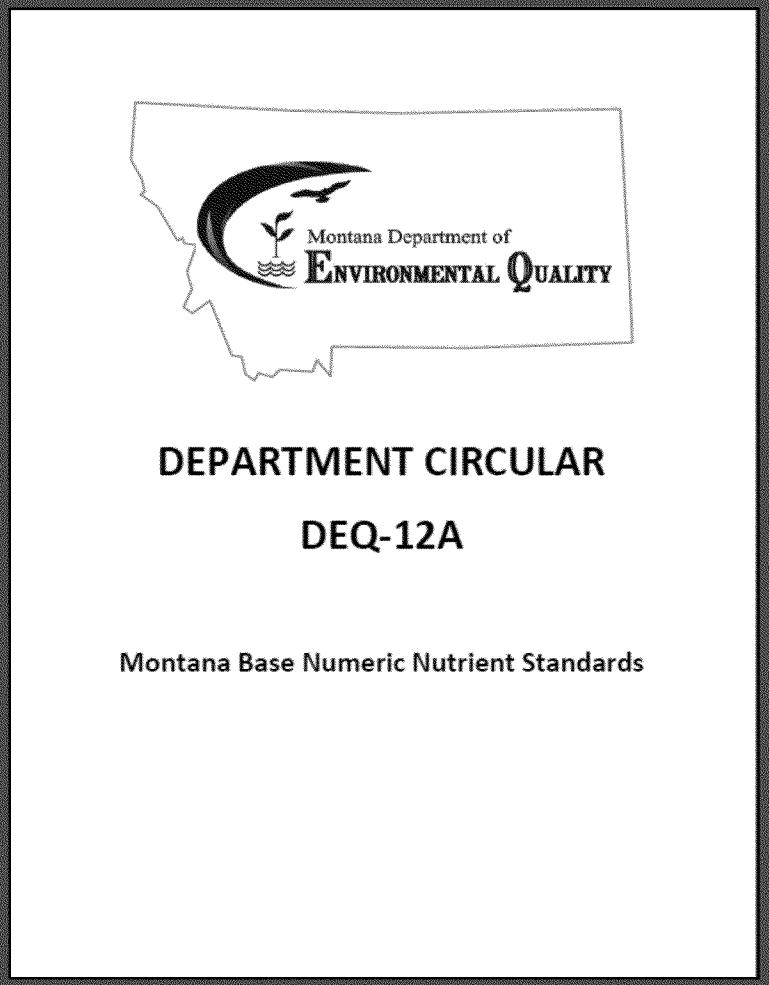
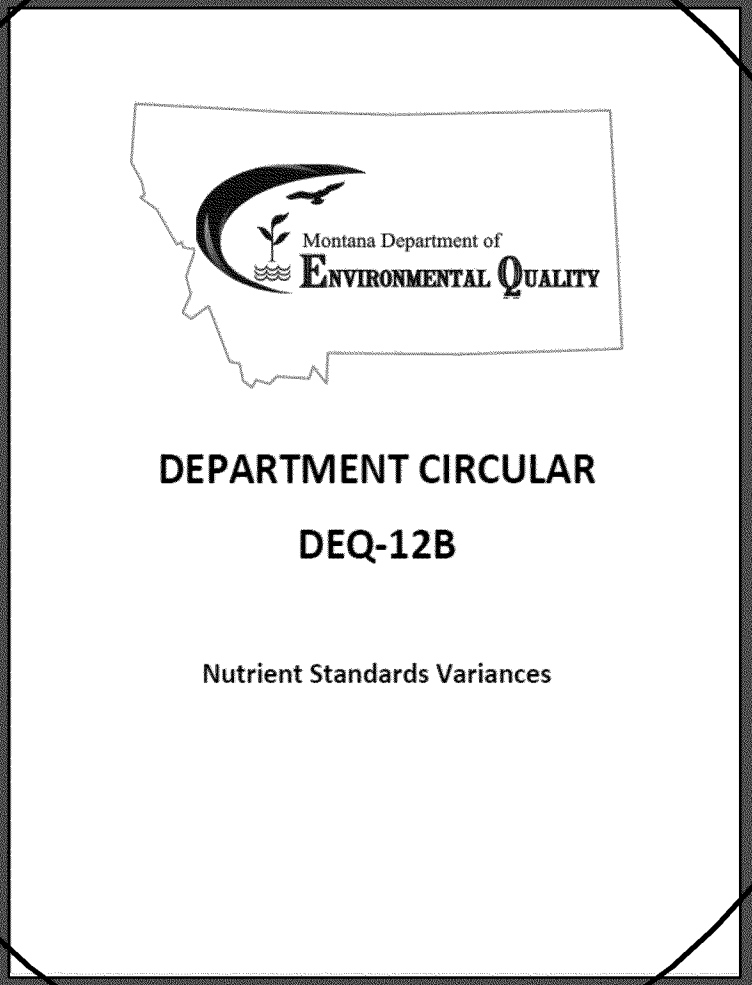
Ongoing Review and Update of Circular DEQ-12B: Nutrient Standards Variances

Nutrient Work Group Meeting #3

Helena, MT

March 20, 2017





http://deq.mt.gov/Water/WQPB/Standards

2017: Completing Nutrient Standards Variances Triennial Review

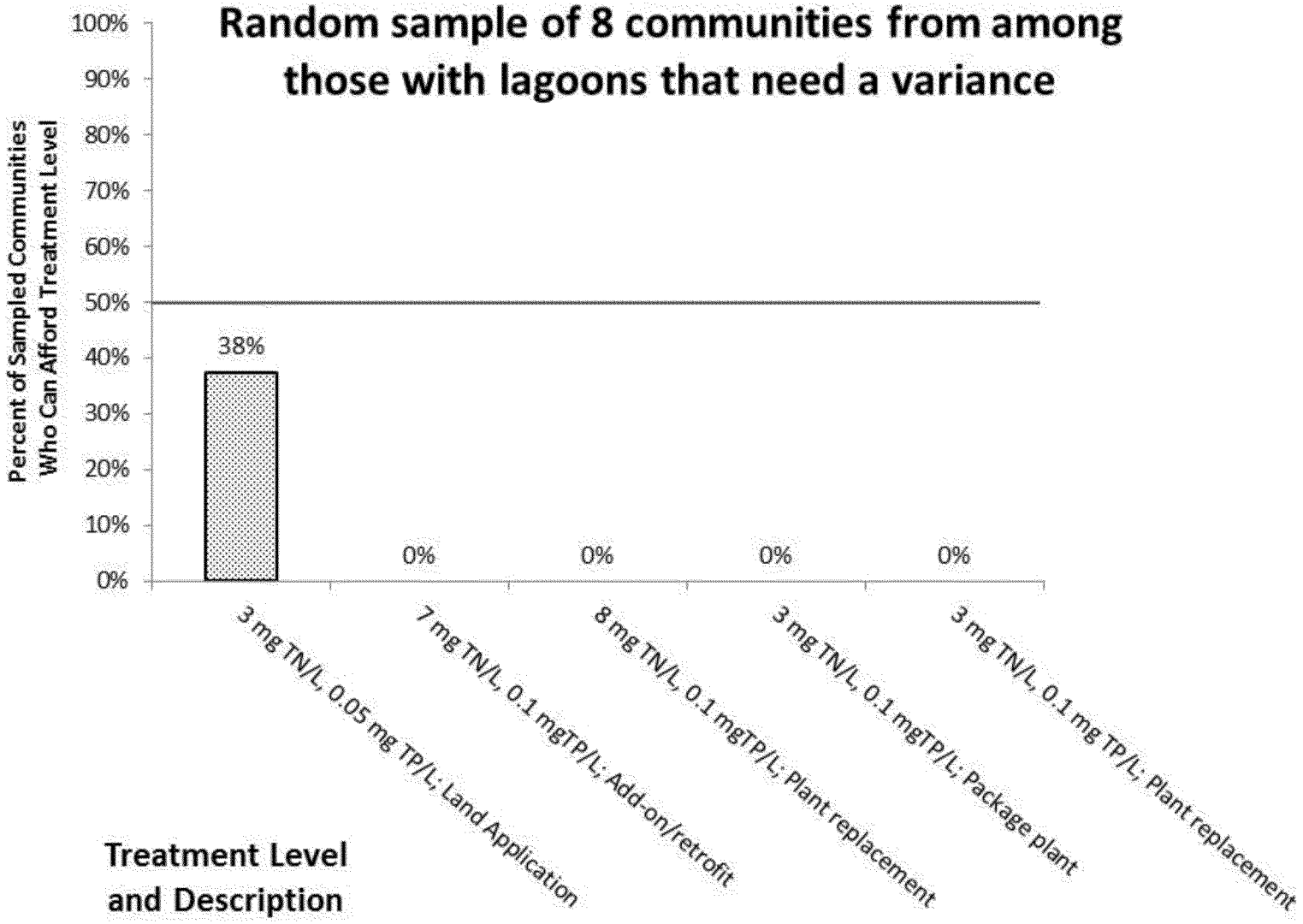
- **March 20th and 27th:** Nutrient Work Group meetings. Report out from subcommittee discussions, etc. Draft DEQ-12B review between meetings.
- **April 3rd:** Filing date by noon, proposed rule amendments (MAR notice, includes: notice of public hearing (i.e., hearing date), public comment period extent, Statement of Reasonable Necessity (SRN), rule amendments.
- **April 13th**: Present proposed rules to WPCAC.
- **April 14th**: MAR notice published. Inform all interested parties, send out press release or similar. Materials for public should be ready (SRN, DEQ-12B, tech doc)
- **May 31st:** Public hearing, after 45 days. DEQ, Room 111, 9am-12, Helena.
- **June 1st to June 9th**: Review and address comments, finalize rules/DEQ-12B, get signature by Department Head by June 9th.
- **June 12th**: Filing date deadline, by noon. MAR notice of adoption.
- **June 23rd:** MAR publication date for the adopted rules.
- **July 1st, 2017**: Variances in Circular DEQ-12B set to expire.

Cost analyses for highest attainable condition

- Lagoon category
- ≥1MGD, <1MGD categories (*mechanical facilities*)

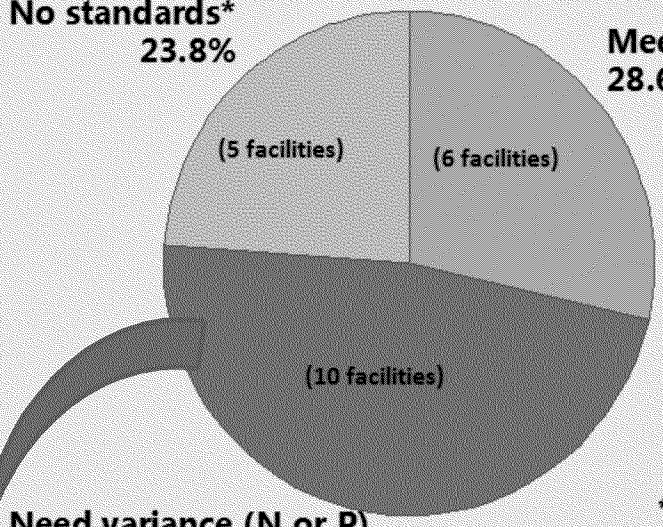
Lagoon Category

65 individual permits, ≤40 likely need variance (analysis below is only for POTWs)



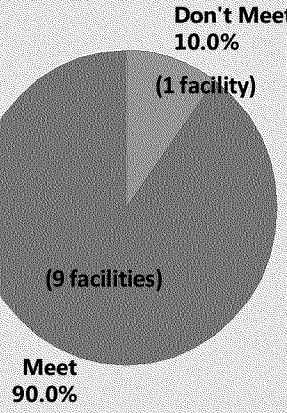
Mechanical Facility Groups (≥1MGD, <1MGD)

≥1MGD Group

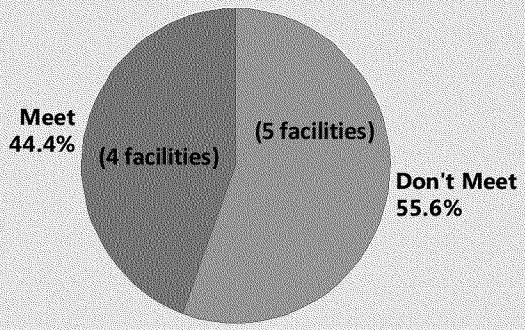


Except Yellowstone River, where estimated standards were used, where needed.

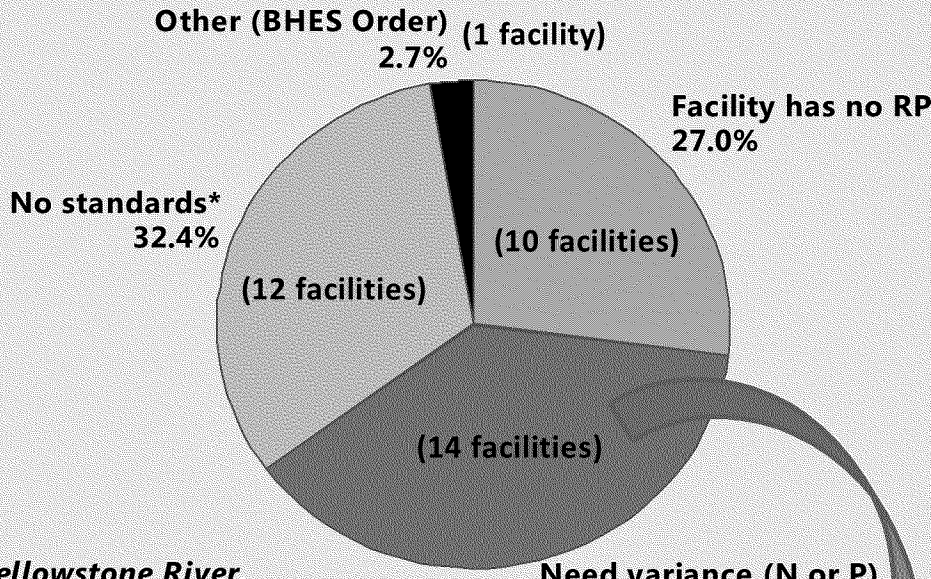
Can Meet 10 mg TN/L Variance Today?



Can Meet 1 mg TP/L Variance Today?

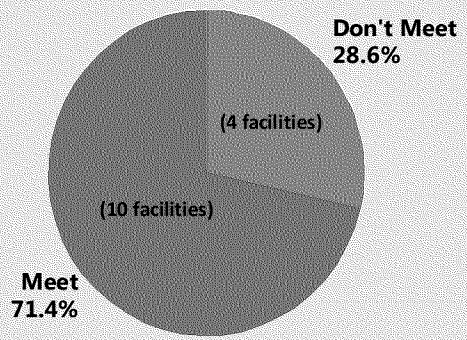


<1MGD Group

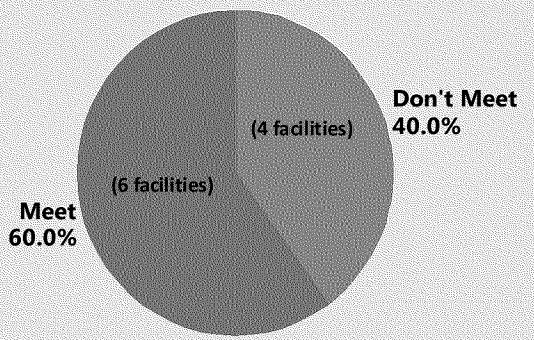


Except Yellowstone River, where estimated standards were used, where needed.

Can Meet 15 mg TN/L Variance Today?



Can Meet 2 mg TP/L Variance Today?



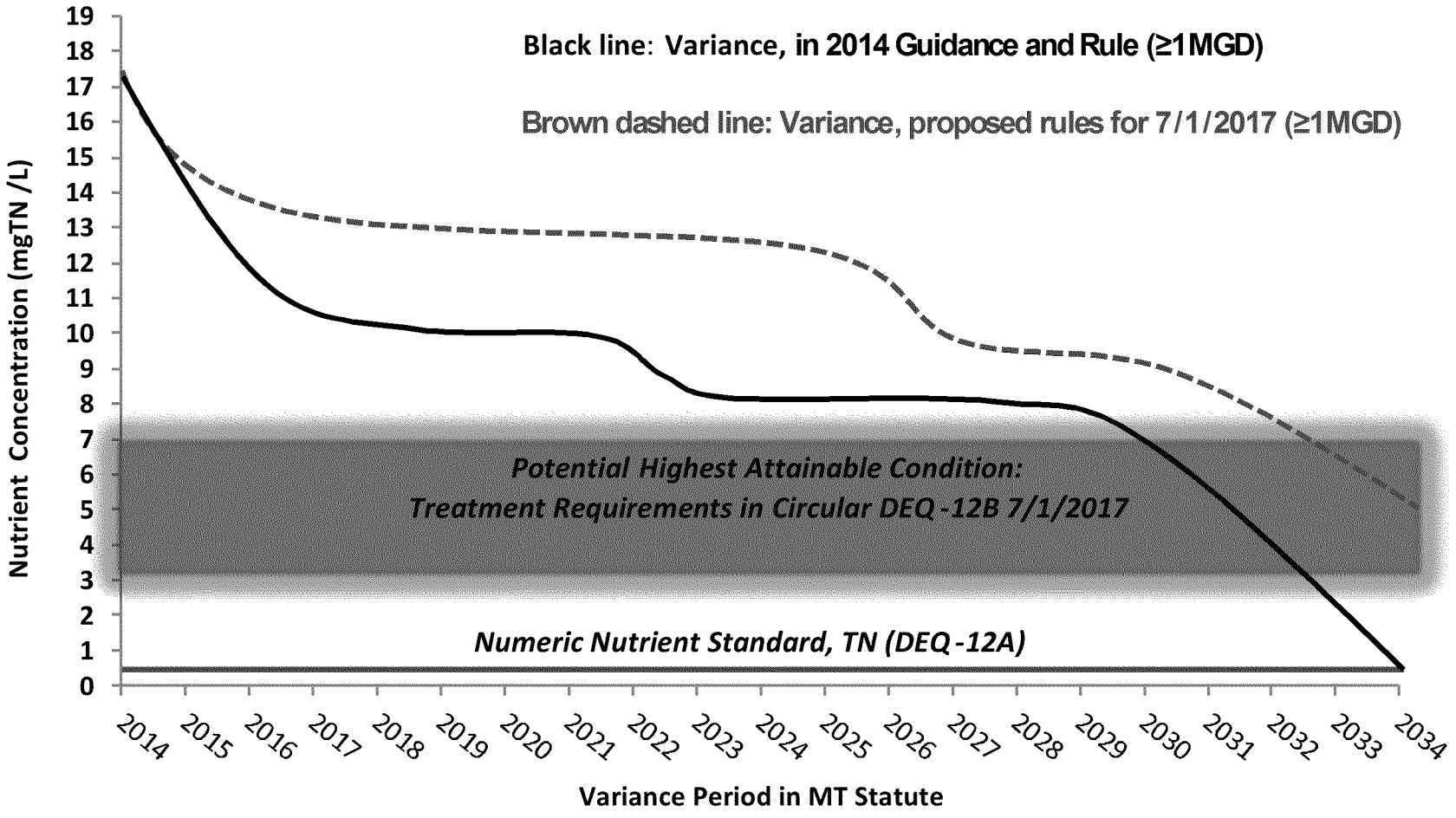


Illustration of variance process over 20 years, as currently constructed and as proposed. Example is for TN for the ≥1MGD group. As currently constructed, the numeric nutrient standards are the highest attainable condition (HAC). Going forward, *where the nutrient standards are unattainable*, the HAC would be in Circular DEQ-12B. HAC may change in the future. The longest time to achieve HAC is illustrated; it may take less time.

What will get updated in Circular DEQ-12B…

Table 12B-1. General variance end-of-pipe treatment requirements.

	Monthly Average	
Discharger Category[1]	**Total P (µg/L)**	**Total N (µg/L)**
≥ 1.0 million gallons per day	1,000	10,000
< 1.0 million gallons per day	2,000	15,000
Lagoons not designed to actively remove nutrients	Maintain current performance	Maintain current performance

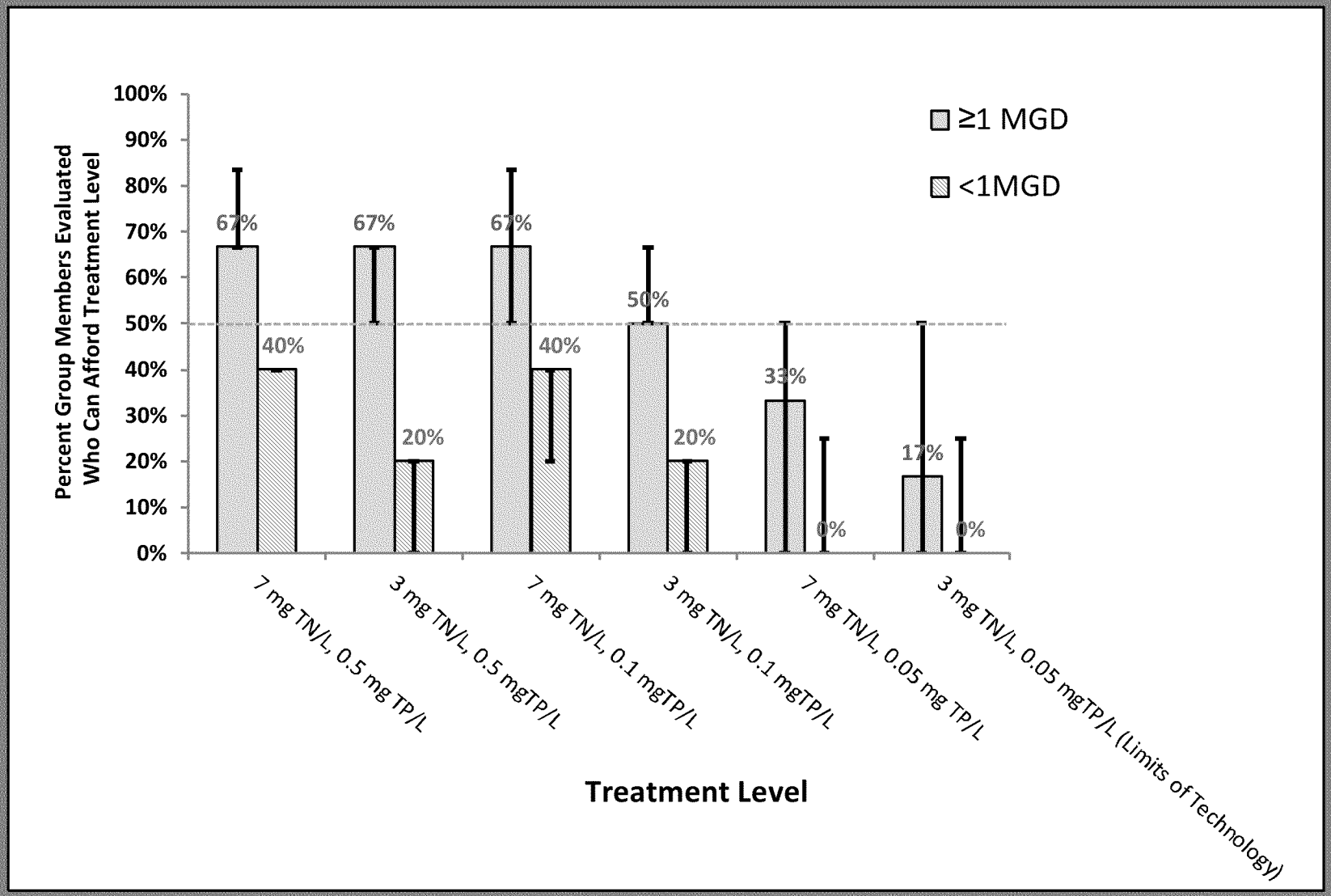
[1] See Endnote 1

Endnote 1 says the categories are to be based on design flow.

HAC Ranges, Based on Work Reviewed by the Subcommittee

- Met five times between February 9th and March 13th, 2017
- ≥1MGD Discharge Category: In the range of 4 to 7 mg TN/L, and >0.1 to 0.4 mg TP/L.
- <1MGD Discharge Category: 7 mg TN/L and 0.5 mg TP/L were not affordable for most POTWs in this group. Treatment cost estimates for concentrations greater than these were not conducted, so subcommittee relied on the potential for facility optimization. HAC in the range of >>7 to 10 mg TN/L, and 1.0 mg TP/L.
- Lagoon Discharge Category: No change to current method of implementing general variances for communities with wastewater lagoons.

≥1MGD, <1MGD Mechanical Categories



Percent of Members in a Discharger Group (≥ 1MGD, <1MGD) Who Can Affordably Meet (Per DEQ Methods) a Specified Wastewater Treatment Level. Only POTW group members are shown, and, among them, only those that will probably need a variance. Error bars are the % of members who can afford a treatment level, based on a range of cost estimates for the facility upgrades (per class 5 engineering planning estimates).

Recent Effluent Quality of Facilities Likely to Need a Variance

Facilties in≥1MGD Category Likely to Need a Variance.						Discharge Effluent Quality	
MPDES ID	Size	Total Actual Average Flow (MGD)	Facility Type Indicator	FLOW (MGD) (Design average, or if private, average of most recent 2 years)	Facility Type (L-lagoon, M-mechanical O-other, with detail)	Median TN (mg/L)	Median TP (mg/L)
MT0020184	> 1 MGD	0.92	POTW	1.8	M	24.2	0.47
MT0022586	> 1 MGD	15	POTW	26	M	17.3	1.90
MT0021938	> 1 MGD	2.7	POTW	5.4	M	8.4	0.15
MT0022535	> 1 MGD	1.384	POTW	1.8	M	7.9	1.34
MT0022641	> 1 MGD	2.8	POTW	5.4	M	5.6	2.36
MT0022608	> 1 MGD	6.225	POTW	8.5	M	4.4	0.17
MT0020028	> 1 MGD	0.677	POTW	1.984	M	3.1	3.38
MT0022012	> 1 MGD	3.64	POTW	5.5	M	2.4	2.10
MT0000256	UNK	see column "FLOW (MGD)"	NON-POTW	1.573	M	1.5	0.30
MT0031755	UNK	see column "FLOW (MGD)"	NON-POTW	0	M	1.3	0.031

Facilties in<1MGD Category Likely to Need a Variance.						Discharge Effluent Quality	
MPDES ID	Size	Total Actual Average Flow (MGD)	Facility Type Indicator	FLOW (MGD) (Design average, or if private, average of most recent 2 years)	Facility Type (L-lagoon, M-mechanical O-other)	Median TN (mg/L)	Median TP (mg/L)
MT0021431	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.01	M	28.2	6.48
MT0000205	UNK	see column "FLOW (MGD)"	NON-POTW	0	M	22.7	0.00
MT0027430	< 1 MGD	0.023	POTW	0.05	M	20.5	7.13
MT0023566	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.01	M	16.9	2.45
MT0022713	< 1 MGD	0.344	POTW	0.344	M	14.8	2.84
MT0024716	UNK	see column "FLOW (MGD)"	NON-POTW	0.51	M	10.7	0.02
MT0022560	< 1 MGD	0.307	POTW	0.434	M	10.6	0.53
MT0021857	< 1 MGD	0.15	POTW	0.37	M	8.7	0.60
MT0020079	< 1 MGD	0.32	POTW	0.54	M	7.0	0.15
MT0026808	UNK	see column "FLOW (MGD)"	NON-POTW	0.28	M	4.9	1.34
MT0029891	UNK	see column "FLOW (MGD)"	NON-POTW	0.48	O	4.5	0.02
MT0020125	< 1 MGD	0.11	POTW	0.502	M	2.9	1.84
MT0031721	< 1 MGD	see column "FLOW (MGD)"	NON-POTW	0.864	M	1.9	0.00
MT0030350	UNK	see column "FLOW (MGD)"	NON-POTW	0.44	M	0.5	0.24

BNR Facilities Around the Country

Table 2. 95th percentile performance from a non-random sample of facilities with advanced nutrient removal.

95th percentile, from DMR data, above facilities.
95th percentile, from WERF (2011)*

Duel-nutrient facilities

	TN (mg/L)		TP (mg/L)	
Butte (MT)	3.2	Butte (MT)	*too soon*	
Bozeman (MT)	8.1	Bozeman (MT)	0.58	
Palmetto (FLA)	3.6	Palmetto (FLA)	0.56	
Annapolis (MD)	6.8	Annapolis (MD)	0.25	
Bowie (MD)	4.6	Bowie (MD)	*no data*	
Largo (FLA)	3.5	Largo (FLA)	0.60	
Frederick (MD)	9.1	Frederick (MD)	1.07	
Westminster (MD)	5.7	Westminster (MD)	0.40	
Cambridge (MD)	3.9	Cambridge (MD)	*no data*	
Cumberland (MD)	3.8	Cumberland (MD)	0.30	
Fiesta Village (FL)	2.71	Iowa Hill (CO)	0.05	
Kulkaska (MI)	2.40	Blue Plains (DC)	0.18	
Western Branch (MD)	3.20	Pinery (CO)	0.05	
River Oaks (FL)	2.92	F.Wayne Hill (GA)	0.11	
Truckee Meadows (NV)	2.85	Rock Creek (OR)	0.21	
Scituate (MA)	4.22	ASA (VA)	0.12	
Piscataway (MD)	8.00	Cauley Creek (GA)	0.16	
Tahoe-Truckee (CA)	3.37	Clark Country (NV)	0.20	
Eastern WRF (FL)	8.56	Kalispell (MT)	0.23	
Parkway (MD)	6.40	Kelowna (BC)	0.32	
Group Median:	**3.9** mg TN/L	***Group Median:***	**0.23** mg TP/L	

*Bott, C.B., and D.S. Parker, 2011. Nutrient Management Volume II: Removal Technology Performance and Reliability. Water Environmental Research Foundation (WERF), Document No. NUTR1R06k.

Variance Permitting Process for TN, TP Today

- To DEQ, variance treatment requirements are long term averages (LTA), and limits are expressed (per statute) as Average Monthly Limit (AML), so:

Variance (mg/L) * Table 5-2 $value_{95th}$ * Design Flow * conversions = Permitted Load Limit (lbs/day)

From Permitting's Technical Support Document—based on coefficient of variation (CV; SD/mean) as calculated from samples from discharger's effluent

Coefficient of Variation (CV) in the variance permitting process

- Currently based on CV of *past* data
- CVs likely to go up at lower nutrient effluent concentrations; could lead to compliance problems
- Using a fixed CV of 0.6 is a realistic CV for nutrient effluent data at low concentrations

HAC Ranges etc., Based on Work Reviewed by the Subcommittee

- ≥1MGD Discharge Category: In the range of 4 to 7 mg TN/L, and >0.1 to 0.4 mg TP/L.
- <1MGD Discharge Category: 7 mg TN/L and 0.5 mg TP/L were not affordable for most POTWs in this group. Treatment cost estimates for concentrations greater than these were not conducted, so subcommittee relied on the potential for facility optimization. HAC in range of >>7 to 10 mg TN/L, and 1.0 mg TP/L.
- Use a CV of 0.6 to calculate load-based variance limit for the mechanical facility categories
- Lagoon Discharge Category: No change to current method of implementing general variances for communities with wastewater lagoons.

Before and After 7/1/2017

- Table 12B-1 in the Circular defines the treatment level POTWs must meet under the general variance
  - If a facility was treating wastewater better than the levels in the table before 7/1/2017, then their actual treatment level defines the variance limit
  - If a facility does not meet the updated levels in the table on 7/1/2017, but meets them (or does better) afterwards, the table values define the permit limit
  - Treatment requirements under the general variance could change again later (i.e., become more stringent)
    - Updated table values would define group treatment level

Time to Achieve HAC

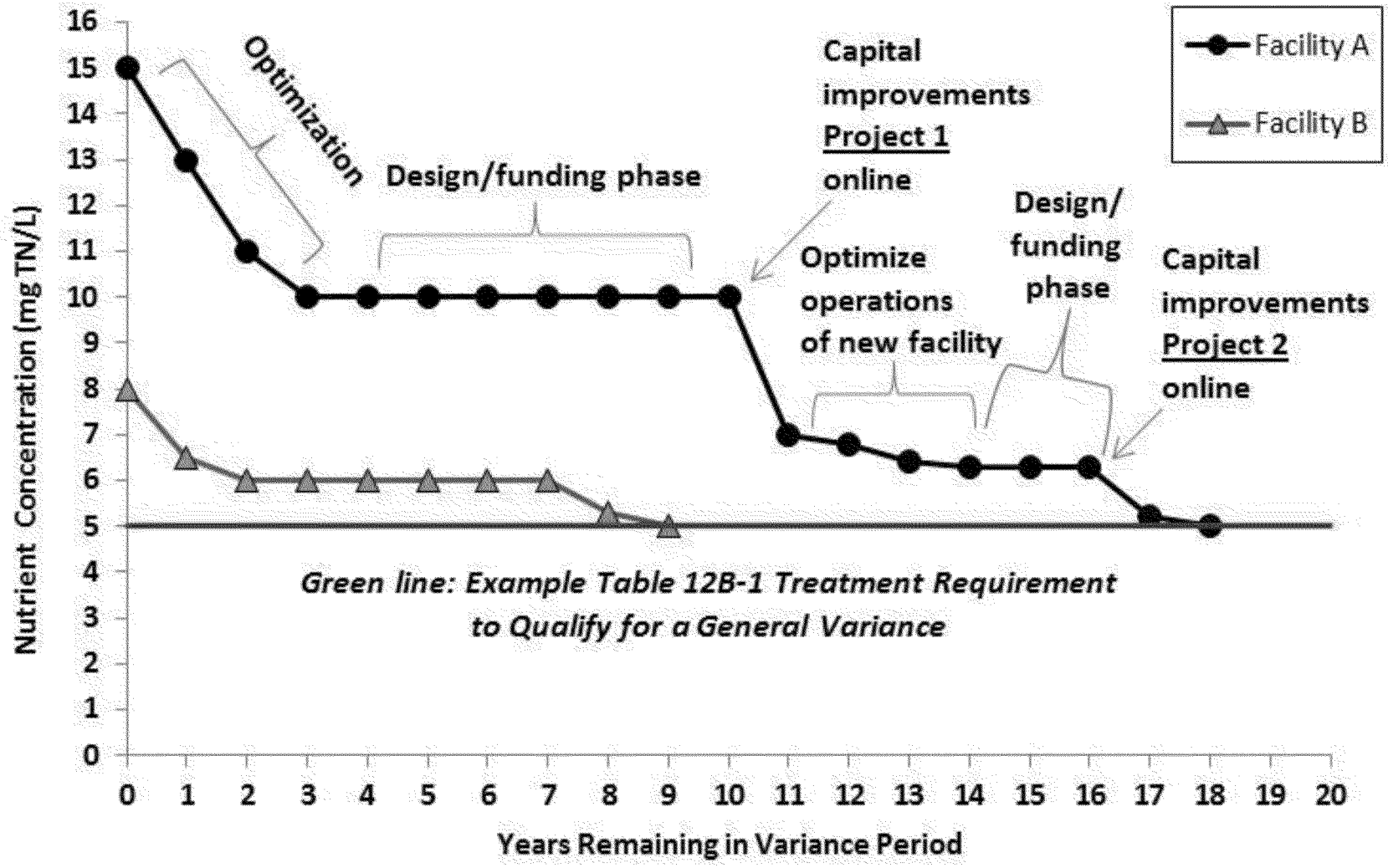


Table 7-1. Steps and Approximate Time to Achieve the Treatment Requirements in Table 12B-1.

Description of Step	Approximate Time to Complete Step (years)
1. Implementation of advanced operational strategies to reduce nutrients using existing infrastructure. Evaluate effects of operational changes and fine tune as necessary. Operations staff identify potential minor capital improvements, if any, that could be made to further advance operational strategies. Prepare optimization study, as required in **Section 2.2** of this circular, including documentation of operational changes and results as well as a preliminary feasibility assessment of the viability of trading, reuse, etc.	**2**
2. **If Table 12B-1treatment requirements are not achieved**, hire an engineer to prepare a preliminary engineering report (PER) that evaluates options for minor and/or major facility improvements, trading or reuse that lead to further nutrient reductions that build upon developed operational strategies, if appropriate. Continue to fine-tune operational strategies. Begin discussion with funding agencies and submit PERs to those agencies, if necessary (for major upgrades).	**1**
3. Go through funding agency timelines and requirements for planning, if necessary. This may involve legislative approval. Implement minor facility improvements, if appropriate, and fine tune operations for further TN and TP reductions.	**2**
4. Design major capital improvements. Go through the department (DEQ) and other funding agency review and approval processes for the design/bidding phase, including MEPA analysis, adjustments of rates and charges, legal opinions, etc. Bid major capital project.	**2**
5. Construct major capital project, including trading and/or reuse, if appropriate. Begin operating new infrastructure and fine tuning operations. Continue with advanced operational training with new infrastructure. Evaluate nutrient reductions achieved with major capital project and operator optimization.	**4**
6. **If Table 12B-1 treatment requirement are still not achieved**, hire engineer to evaluate alternatives in a PER for next steps to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
7. Submit PER to funding agencies for review, approval, MEPA, etc. Legislative approval required? Obtain funding.	**2**
8. Design and bid capital project to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
9. Construct capital upgrades, including trading, reuse, etc., if appropriate. Continue with operational optimization to meet **Table 12B-1** treatment requirements.	**2**

9 steps

If fewer steps are needed to achieve Table 12B-1 treatment requirements (i.e., HAC), then less than full time allotment would generally be needed

Optimization, and Pollution Minimization Program Requirement (PMP)

- Going forward, the optimization plan—which currently must be completed—will be required to be implemented
- PMP: Required by those under a variance when they achieve treatment requirements in Table 12B-1
  - Time to achieve the treatment requirements will vary
- PMP is a structured set of activities to improve processes and pollutant controls that will prevent & reduce pollutant loading
- PMP examples include:
  - reducing pollutants before they enter the wastewater treatment system
  - BMPs to mitigate nonpoint source nutrient inputs

For the Nutrient Work Group's Consideration:

DEQ is seeking input on identifying the specific HAC value within these ranges:

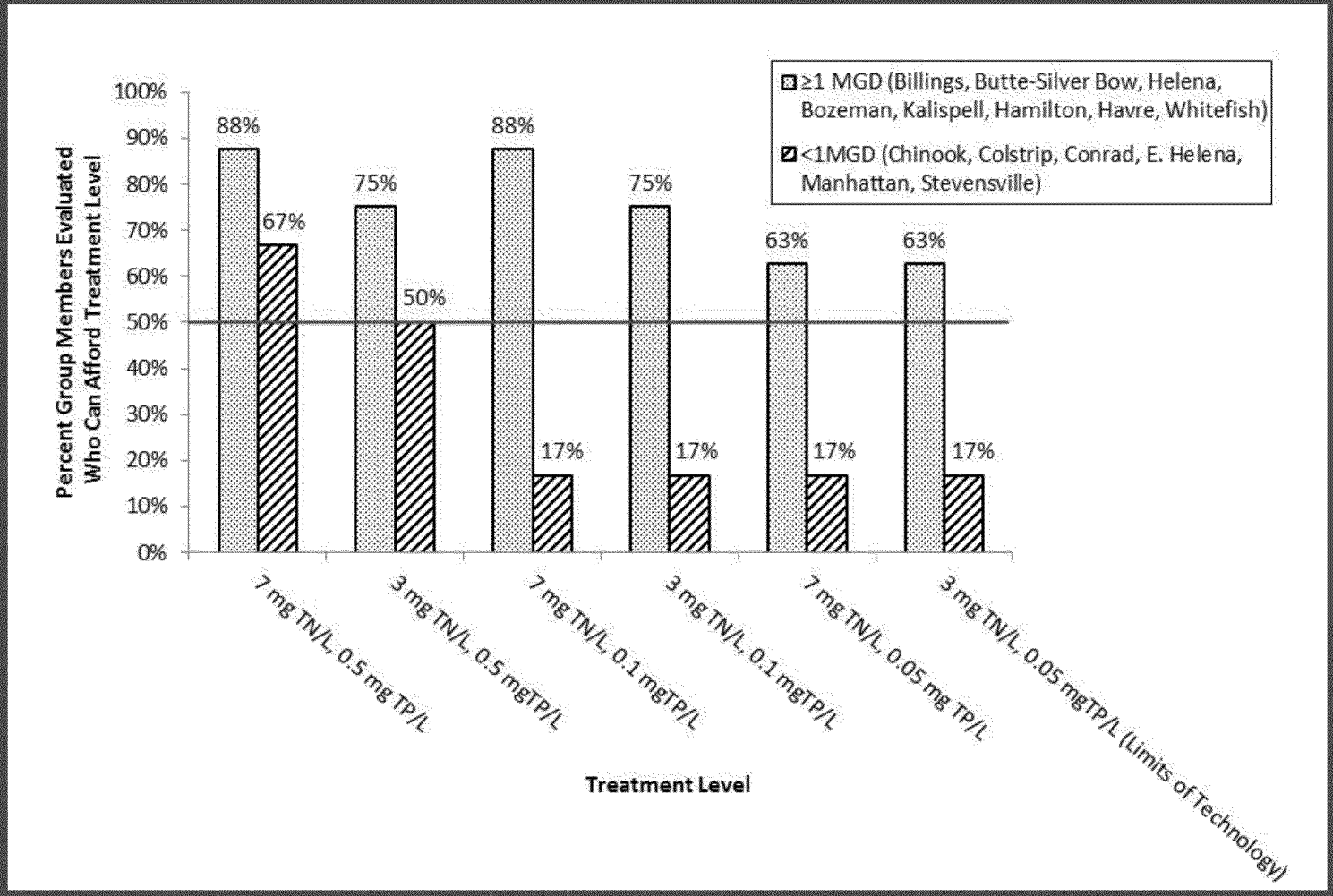
- ≧1MGD Discharge Category: 4 to 7 mg TN/L, and >0.1 to 0.4 mg TP/L.

- <1MGD Discharge Category: >>7 to 10 mg TN/L, and 1.0 mg TP/L

Thank You

Placeholder slides to cover likely questions…

Analysis, as of 1/24/2017



Percent of members in a discharge group (≥1 MGD, < 1 MGD) who can affordably meet different wastewater treatment levels, per methods in DEQ Guidance (2014). Only POTWs are shown and, among them, only those that are likely to need a variance.

Reduction Steps in Current Guidance

- **1. Facilities > 1 million gallons per day:**

- A. By 2016 (or first receipt of general variance): 10 mg TN/L, 1.0 mg TP/L
- B. Next permit cycle (+5 years): 8 mg TN/L, 0.8 mg TP/L
- C. Next permit cycle (+5 years): 8 mg TN/L, 0.5 mg TP/L
- D. Next permit cycle (+5 years): *Under Development*

- **2. Facilities < 1 million gallons per day:**

- A. By 2016 (or first receipt of general variance): 15 mg TN/L, 2.0 mg TP/L
- B. Next permit cycle (+5 years): 12 mg TN/L, 2.0 mg TP/L
- C. Next permit cycle (+5 years): 10 mg TN/L, 1.0 mg TP/L
- D. Next permit cycle (+5 years): 8 mg TN/L, 0.8 mg TP/L

- **3. Lagoons not designed to actively remove nutrients:**

- A. By 2016 (or first receipt of general variance): Maintain current lagoon performance and commence nutrient monitoring in the effluent
- B. Next permit cycles (+5 years): Implement BMPs identified during optimization study so long as the BMPs do not require major investment

Nutrient Season TN Concentrations in Effluent for an Example WWTP

Month	Day	Year	monitoring_period_end_date	TN concentration	Units
7	31	2013	7/31/2013	2.82	mg/L
7	31	2014	7/31/2014	3.1	mg/L
7	31	2015	7/31/2015	4.2	mg/L
8	31	2013	8/31/2013	3.1	mg/L
8	31	2014	8/31/2014	3.2	mg/L
8	31	2015	8/31/2015	4.4	mg/L
9	30	2013	9/30/2013	3.47	mg/L
9	30	2014	9/30/2014	3.6	mg/L
9	30	2015	9/30/2015	4.8	mg/L
			Standard Deviation:	**0.68**	
			Mean:	**3.63**	
			CV:	**0.19**	

Table 5-2 multiplier = ~1.16
(@ n = 4 samples/month, typical weekly sampling)